



CloudByte User Guide

ElastiStor Appliance ESA - A50

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Preface

About This Manual

This manual is written for professional system integrators and PC technicians. It provides information for the installation and use of the CloudByte ElastiStor Appliance-A50 (ESA-A50). Installation and maintenance should be performed by experienced technicians only.

The ESA-A50 is a high-end storage server solution based on the rackmount chassis and the dual processor serverboard.

Manual Organization

Chapter 1: Introduction

The first chapter provides a checklist of the main components included with the server system and describes the main features of the serverboard and the chassis.

Chapter 2: Server Installation

This chapter describes the steps necessary to install the ESA-A50 into a rack and check out the server configuration prior to powering up the system. If your server was ordered without processor and memory components, this chapter will refer you to the appropriate sections of the manual for their installation.

Chapter 3: System Interface

Refer here for details on the system interface, which includes the functions and information provided by the control panels on the chassis as well the HDD carrier LEDs.

Chapter 4: Standardized Warning Statements

You should thoroughly familiarize yourself with this chapter for a general overview of safety precautions that should be followed when installing and servicing ESA-A50.

Chapter 5: Advanced Serverboard Setup

Chapter 5 provides detailed information on the serverboard, including the locations and functions of connections, headers and jumpers. Refer to this chapter when adding or removing processors or main memory and when reconfiguring the serverboard.

Chapter 6: BIOS

The BIOS chapter includes an introduction to BIOS and provides detailed information on running the CMOS Setup Utility.

Appendix A: BIOS Error Beep Codes

Appendix B: System Specifications

Notes

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Appendix A BIOS Error Beep Codes

Appendix B System Specifications

Appendix A

BIOS Error Beep Codes

During the POST (Power-On Self-Test) routines, which are performed at each system boot, errors may occur.

Non-fatal errors are those which, in most cases, allow the system to continue to boot. The error messages normally appear on the screen.

Fatal errors will not allow the system to continue with bootup procedure. If a fatal error occurs, you should consult with your system manufacturer for possible repairs.

These fatal errors are usually communicated through a series of audible beeps. The numbers on the fatal error list correspond to the number of beeps for the corresponding error.

BIOS Error Beep Codes		
Beep Code/LED	Error Message	Description
1 beep	Refresh	Ready to boot
5 short beeps + 1 long beep	Memory error	No memory detected in the system
5 beeps	No Con-In or No Con-Out devices	Con-In: USB or PS/2 keyboard, PCI or Serial Console Redirection, IPMI KVM or SOL Con-Out: Video Controller, PCI or Serial Console Redirection, IPMI SOL
1 beep	Refresh	1 beep for each USB device installed
X9 IPMI Error Codes		
1 Continuous Beep	System OH	System Overheat

Notes

Appendix B

System Specifications

Processors (each node)

Single or dual Intel® Xeon E5-2400 of up to 95W in B2 type sockets (both CPUs must be of the same type)

Note: Please refer to our web site for a complete listing of supported processors.

Chipset

Intel C602J

BIOS

16 Mb AMI® Flash ROM

Memory Capacity (each node)

Six DIMM slots that can support up to 192 GB of Registered (RDIMM) ECC/Non-ECC DDR3-1866/1600/1333/1066/800 memory

Note: see Section 5-6 for details.

SAS/SATA (each node)

Two external SAS 2.0 x4 ports (eight 6Gb/s lanes) and two SATA 3.0 ports with power header for for SATA DOM

Drive Bays

Twenty-four hot-swap drive bays to house 3.5" hard drives

Expansion Slots (each node)

Riser card with four PCI-E 3.0 x8 (in x24 slots)

Serverboard (two per system)

X9DBS-F (Proprietary form factor)

Dimensions: 16.64 x 8.1 in (423 x 206 mm)

Chassis

SC927ETS-R1200NDBP (2U rackmount)

Dimensions: (WxHxD) 17.2 x 3.5 x 26.75 in. (437 x 88 x 679 mm)

Weight (Net): 56 lbs. (25.5 kg.)

Weight

Gross (Bare Bone): 85 lbs. (38.6 kg.)

System Cooling

Three sets of 4-cm counter-rotating fans above each node, two sets of counter-rotating fans at the back of each node, one set of counter-rotating fans on each serverboard (each set contains two fans placed back-to-back)

System Input Requirements

AC Input Voltage: 100 - 240V AC auto-range

Rated Input Current: 11 - 4.5A max

Rated Input Frequency: 50 to 60 Hz

Power Supply

Rated Output Power: 920W (Part# PWS-920P-SQ) 80 Plus Platinum Certified

Rated Output Voltages: +5V (45A), 3.3V (24A), -12V (0.6A)

Operating Environment

Operating Temperature: 10° to 35° C (50° to 95° F)

Non-operating Temperature: -40° to 70° C (-40° to 158° F)

Operating Relative Humidity: 8% to 90% (non-condensing)

Non-operating Relative Humidity: 5 to 95% (non-condensing)

Regulatory Compliance

Electromagnetic Emissions: FCC Class A, EN 55022 Class A, EN 61000-3-2/-3-3, CISPR 22 Class A

Electromagnetic Immunity: EN 55024/CISPR 24, (EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11)

Safety: CSA/EN/IEC/UL 60950-1 Compliant, UL or CSA Listed (USA and Canada), CE Marking (Europe)

California Best Management Practices Regulations for Perchlorate Materials:

This Perchlorate warning applies only to products containing CR (Manganese Dioxide) Lithium coin cells. "Perchlorate Material-special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate"

(continued from front)

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Chapter 1

Introduction

1-1 Overview

The ESA-A50 is a high-end Super Storage Bridge Bay (SBB) system comprised of two main subsystems: the chassis and two dual processor serverboards. Please refer to our web site for information on operating systems that have been certified for use with the system (www.cloudbyte.com).

In addition to the serverboard and chassis, various hardware components have been included with the ESA-A50, as listed below. Quantities indicate the number included in the whole system (two nodes).

- Four passive CPU heatsinks
- Ten 4-cm counter-rotating fans
- Two KVM cables
- SAS/SATA Accessories
 - One SAS midplane
 - Twenty-four hard drive carriers
- Two riser cards for PCI-Express 3.0 expansion cards
- Two SAS controller mezzanine cards (one per node)
- One set of rackmount hardware

Note: For your system to work properly, please follow the links below to download all necessary drivers/utilities and the user's manual for your server.

- CloudByte product manuals: <http://www.docs.cloudbyte.com>
- If you have any questions, please contact our support team at: support@cloudbyte.com

1-2 Serverboard Features

The ESA-A50 is built around two serverboards for a dual-node system that shares storage resources as well as features a dedicated PCI-E bus between server nodes for High Availability (HA), Cluster in a Box (CiB) applications. The serverboard is dual processor based on the Intel® C602J chipset. Below are the main features of the serverboard. (See Figure 1-1 for a block diagram of the chipset).

Processors

The serverboard supports single or dual Intel® Xeon E5-2400 of up to 95W in B2 type sockets. Two serverboards are included in the storage system. Please refer to the serverboard description pages on our web site for a complete listing of supported processors (www.cloudbyte.com).

Memory

Each X9DBS-F has six DIMM slots that can support up to 192 GB of Registered (RDIMM) ECC/Non-ECC DDR3-1866/1600/1333/1066/800 memory. See Chapter 5 for details.

SAS Disk Controller

Two external SAS 2.0 ports are supported by a disk controller on a mezzanine included on each X9DBS-F (four total per system).

SAS Expander

One 36-port SAS expander is integrated into the serverboard.

SATA

Each serverboard has two SATA 3.0 ports with power headers to support two SATA Disk-on-Module (SATA DOM) devices per node. RAID 0 and 1 are supported.

NTB Connectivity

Non Transparent Bridge connectivity featuring 8 lanes of PCI-E 3.0 between server nodes.

PCI Expansion Slots

Each X9DBS-F features one PCI-E 3.0 x24 slot for riser/expansion card support.

Rear Chassis Ports

The rear of each serverboard includes two mini SAS HD ports, two 1 GB Ethernet ports and a KVM connector (includes USB, VGA and COM ports).

Graphics Controller

The serverboard features an integrated Matrox G200eW video controller. The G200eW is a 2D/3D/video accelerator chip with a 128-bit core.

1-3 Server Chassis Features

System Power

The ESA-A50 features a redundant Platinum Level 920W power supply composed of two separate power modules. This power redundancy feature allows you to replace a failed power module without shutting down the system.

SAS Subsystem

The ESA-A50 supports up to 24 3.5" SAS drives. These drives are hot-swappable units and are connected to a midplane that provides power and control.

Front Control Panel

Two control panels are included on each end of the ESA-A50 to provide you with system monitoring and control. LEDs indicate system power, network (NIC) activity, system overheat and power supply failure. Each set of LEDs are associated with the node/serverboard on the same side of the chassis. A single power button is located on the right side control panel. When pressed, both nodes will power on or off.

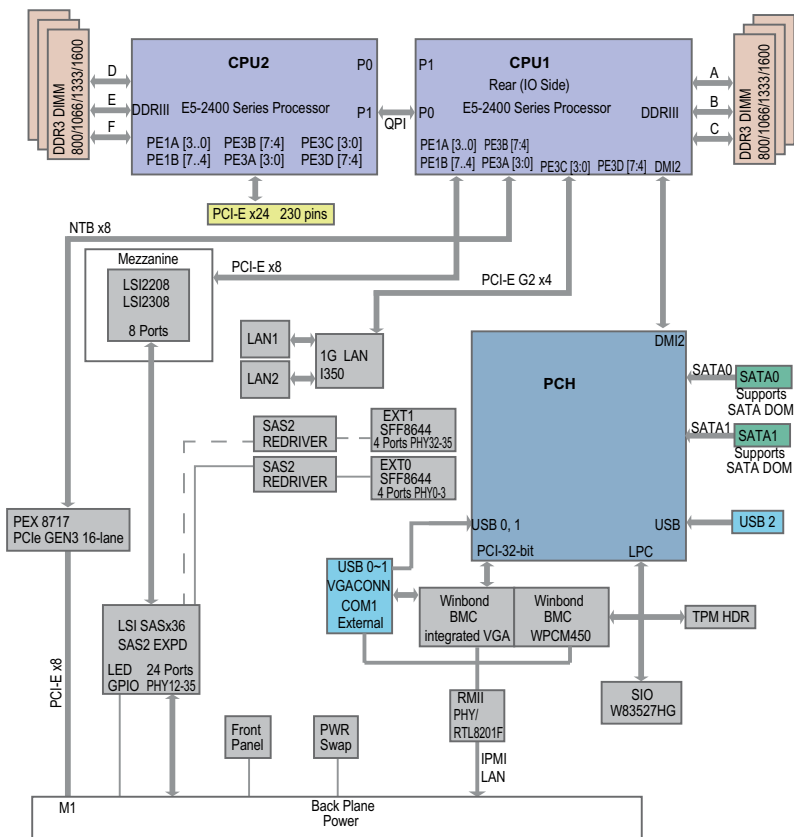
Cooling System

The ESA-A50 chassis has ten 4-cm counter-rotating fans: six at the front and another four at the rear of each node. This counter-rotating action works to dampen vibration levels while generating exceptional airflow.

Another set of back-to-back fans are also located on each serverboard in front of the CPU2 socket. Each power supply module also includes a cooling fan.

**Figure 1-1. Intel C602J Chipset:
System Block Diagram**

Note: This is a general block diagram. Please see Chapter 5 for details.



1-4 Contacting CloudByte

Headquarters

Address: 20863 Stevens Creek Blvd,
Suite 530
Cupertino, CA 95014 USA

Tel: +1-855-380-BYTE (2983)

Fax: +1-(408)-663-6900

Email: info@cloudbyte.com (General Information)
support@cloudbyte.com (Technical Support)

Web Site: www.cloudbyte.com

1-5 SBB: Storage Bridge Bay

The ESA-A50 Super SBB was designed to function as a fully redundant, fault-tolerant "cluster-in-a-box" system. The standard support for 24 3.5" hot-swap HDDs (SAS1 or SAS2) may be expanded to support additional storage with the optional SBB JBOD configuration.

The Super SBB provides hot-swappable canisters for all active components. Each of the two serverboard canisters support dual-processors, 6 DIMM slots, 3 PCI-E Gen2 slots and 6 Gbps SAS (SAS2). The ESA-A50 features eight lanes of PCI-E 3.0 connecting the left server module with the right server module. This connection is used for high speed data transfers between nodes for High Availability/server fail-over. This fail-over capability is fully dependent on the software/OS installed and how the chosen software uses the connection (Active-Active or Active-Passive). ESA-A50 hardware is supplied without a storage OS or fail-over software.

Equipped with 920W 80PLUS Platinum Level redundant power supplies and redundant cooling fans, the ESA-A50 offers fully redundant high-availability while maintaining energy efficient operation.

Chapter 2

Server Installation

2-1 Overview

This chapter provides a quick setup checklist to get your ESA-A50 up and running. Following these steps in the order given should enable you to have the system operational within a minimum amount of time. This quick setup assumes that your system has come to you with the processors and memory preinstalled. If your system is not already fully integrated with a serverboard, processors, system memory etc., please turn to the chapter or section noted in each step for details on installing specific components.

2-2 Unpacking the System

You should inspect the box the ESA-A50 was shipped in and note if it was damaged in any way. If the server itself shows damage you should file a damage claim with the carrier who delivered it.

Decide on a suitable location for the rack unit that will hold the ESA-A50. It should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic fields are generated. You will also need it placed near a grounded power outlet. Read the Rack and Server Precautions in the next section.

2-3 Preparing for Setup

The box the ESA-A50 was shipped in should include two sets of rail assemblies, two rail mounting brackets and the mounting screws you will need to install the system into the rack. Follow the steps in the order given to complete the installation process in a minimum amount of time. Please read this section in its entirety before you begin the installation procedure outlined in the sections that follow.

Choosing a Setup Location

- Leave enough clearance in front of the rack to enable you to open the front door completely (~25 inches) and approximately 30 inches of clearance in the back of the rack to allow for sufficient airflow and ease in servicing.

- This product is for installation only in a Restricted Access Location (dedicated equipment rooms, service closets and the like).
- This product is not suitable for use with visual display work place devices according to §2 of the the German Ordinance for Work with Visual Display Units.

2-4 Warnings and Precautions

Rack Precautions

- Ensure that the leveling jacks on the bottom of the rack are fully extended to the floor with the full weight of the rack resting on them.
- In single rack installation, stabilizers should be attached to the rack. In multiple rack installations, the racks should be coupled together.
- Always make sure the rack is stable before extending a component from the rack.
- You should extend only one component at a time - extending two or more simultaneously may cause the rack to become unstable.

Server Precautions

- Review the electrical and general safety precautions in Chapter 4.
- Determine the placement of each component in the rack *before* you install the rails.
- Install the heaviest server components on the bottom of the rack first, and then work up.
- Use a regulating uninterruptible power supply (UPS) to protect the server from power surges, voltage spikes and to keep your system operating in case of a power failure.
- Allow any hot plug drives and power supply modules to cool before touching them.
- Always keep the rack's front door and all panels and components on the servers closed when not servicing to maintain proper cooling.

Rack Mounting Considerations

Ambient Operating Temperature

If installed in a closed or multi-unit rack assembly, the ambient operating temperature of the rack environment may be greater than the ambient temperature of the room. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (T_{mra}).

Reduced Airflow

Equipment should be mounted into a rack so that the amount of airflow required for safe operation is not compromised.

Mechanical Loading

Equipment should be mounted into a rack so that a hazardous condition does not arise due to uneven mechanical loading.

Circuit Overloading

Consideration should be given to the connection of the equipment to the power supply circuitry and the effect that any possible overloading of circuits might have on overcurrent protection and power supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Ground

A reliable ground must be maintained at all times. To ensure this, the rack itself should be grounded. Particular attention should be given to power supply connections other than the direct connections to the branch circuit (i.e. the use of power strips, etc.).

2-5 Installing the System into a Rack

This section provides information on installing the chassis into a rack unit with the quick-release rails provided. There are a variety of rack units on the market, which may mean the assembly procedure will differ slightly. You should also refer to the installation instructions that came with the rack unit you are using.

Installing the Inner Rack Rails

Installing the Inner Rails

1. Extend the inner rail toward the front of the rail assembly as far as possible, then depress the locking tab to pull it completely out.
2. Place the inner rail on the side of the chassis aligning the hooks of the chassis with the rail extension holes.
3. Slide the extension toward the front of the chassis.
4. You may secure the chassis with screws if desired.
5. Repeat steps 1-3 for the other inner rail.

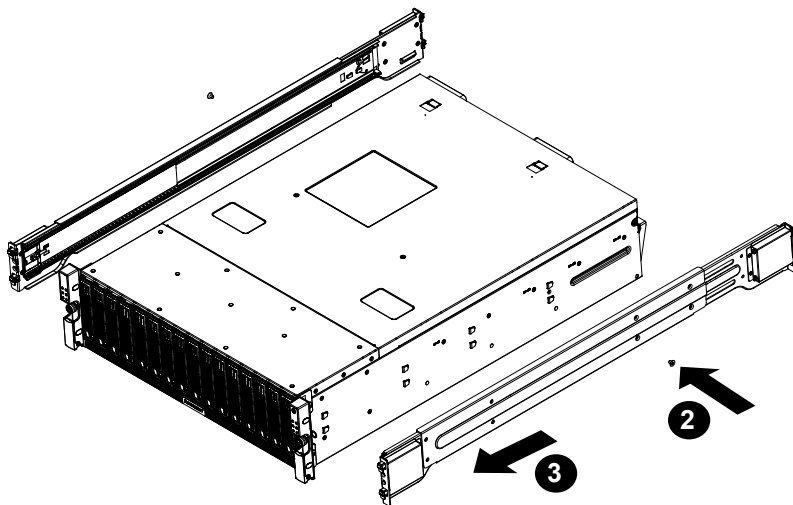


Figure 2-1. Installing the Outer Rack Rails



Warning: do not pick up the server with the front handles. They are designed to pull the system from a rack only.

Installing the Outer Rack Rails

Outer rails attach to the server rack and hold the server in place. The outer rails for the SC937 chassis extend between 30 inches and 33 inches.

Installing the Outer Rails

1. Attach the right outer rail to the rack by inserting the hooks included on the rails into the holes provided on the rack.
2. If desired, screw the rails to the chassis for added support.
3. Repeat these steps for the left outer rail.

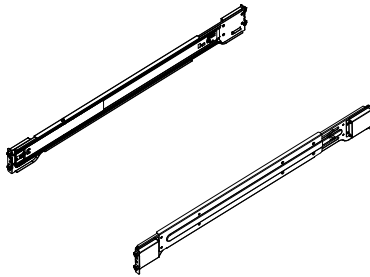


Figure 2-2. Outer Rack Rails

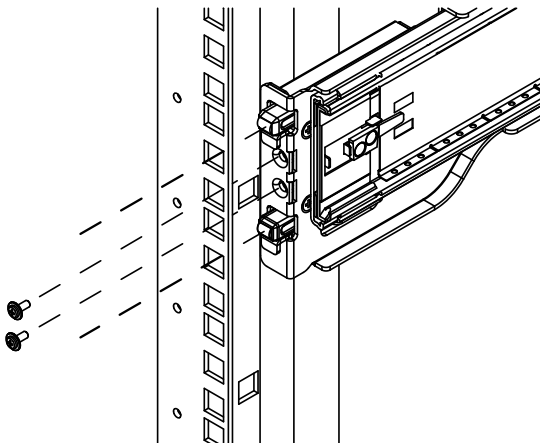


Figure 2-3. Outer Rack Rail Install



Stability hazard. The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over.

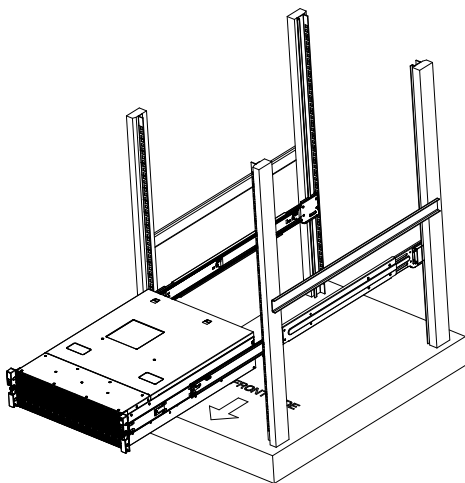


Figure 2-3. Installing the Chassis into the Rack

Installing the Chassis into a Rack

Installing into a Rack

1. Confirm that the inner and outer rails are properly installed.
2. Line up the inner (chassis) rails with the front of the outer (rack) rails.
3. Slide the chassis rails into the rack rails, keeping the pressure even on both sides (you may have to depress the locking tabs when inserting). When the server has been pushed completely into the rack, you should hear the locking tabs "click" into position.
4. (Optional) Insert and tighten the thumbscrews that hold the front of the server to the rack.



Warning! To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Chapter 3

System Interface

3-1 Overview

There are several LEDs on two control panels as well as others on the drive carriers to keep you constantly informed of the overall status of the system as well as the activity and health of specific components. A main power button is also located on the right side (only) control panel.

3-2 Control Panel Button



Power

The single button located on the right control panel is the power on/off button. Depressing this button will either power both nodes on or off. Turning off system power with this button removes the main power but keeps standby power supplied to the system.

3-3 Control Panel LEDs

The two control panels located on the front of the chassis have several LEDs. With the exception of the power fail LED, these LEDs provide you with critical information related to the node on the same side of the chassis. This section explains what each LED indicates when illuminated and any corrective action you may need to take.



Power Fail

Indicates a power supply module has failed. The second power supply module will take the load and keep the system running but the failed module will need to be replaced. Refer to Chapter 6 for details on replacing the power supply. This LED should be off when the system is operating normally.

**Overheat/Fan Fail:**

When this LED flashes, it indicates a fan failure. When on continuously it indicates an overheat condition, which may be caused by cables obstructing the airflow in the system or the ambient room temperature being too warm. Check the routing of the cables and make sure all fans are present and operating normally. You should also check to make sure that the chassis covers are installed. Finally, verify that the heatsinks are installed properly (see Chapter 5). This LED will remain flashing or on as long as the indicated condition exists.

**NIC1**

Indicates network activity on the LAN1 port when flashing.

**NIC2**

Indicates network activity on the LAN2 port when flashing.

**Heartbeat**

On the SuperServer ESA-A50 this is a serverboard heartbeat LED and indicates that power is being supplied to the serverboard.



Power

Indicates power is being supplied to the system's power supply units. This LED should normally be illuminated when the system is operating.

3-4 Drive Carrier LEDs

Each drive carrier has two LEDs:

- **Green:** When illuminated, the green LED on the drive carrier indicates the drive is powered on. If this LED is not lit, it means no power is being provided for the drive. Please refer to Chapter 6 for instructions on replacing failed drives.
- **Red:** A steady red LED indicates a drive failure. If one of the drives fails, you should be notified by your system management software. Please refer to Chapter 6 for instructions on replacing failed drives. If this LED flashes ~ once per second (1 Hz) it indicates RAID rebuilding activity.

Notes

Chapter 4

Standardized Warning Statements for AC Systems

4-1 About Standardized Warning Statements

The following statements are industry standard warnings, provided to warn the user of situations which have the potential for bodily injury. Should you have questions or experience difficulty, contact Cloudbyte's Technical Support department for assistance. Only certified technicians should attempt to install or configure components.

Read this appendix in its entirety before installing or configuring components in the Cloudbyte chassis.

Warning Definition



Warning!

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.

Installation Instructions



Warning!

Read the installation instructions before connecting the system to the power source.

Circuit Breaker



Warning!

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 250 V, 20 A.

Power Disconnection Warning



Warning!

The system must be disconnected from all sources of power and the power cord removed from the power supply module(s) before accessing the chassis interior to install or remove system components.

Equipment Installation



Warning!

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

Restricted Area



Warning!

This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. (This warning does not apply to workstations).

Battery Handling



Warning!

There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions

Redundant Power Supplies



Warning!

This unit might have more than one power supply connection. All connections must be removed to de-energize the unit.

Backplane Voltage



Warning!

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.

Comply with Local and National Electrical Codes



Warning!

Installation of the equipment must comply with local and national electrical codes.

Product Disposal



Warning!

Ultimate disposal of this product should be handled according to all national laws and regulations.

Hot Swap Fan Warning



Warning!

The fans might still be turning when you remove the fan assembly from the chassis. Keep fingers, screwdrivers, and other objects away from the openings in the fan assembly's housing.

Power Cable and AC Adapter



Warning!

When installing the product, use the provided or designated connection cables, power cables and AC adaptors. Using any other cables and adaptors could cause a malfunction or a fire. Electrical Appliance and Material Safety Law prohibits the use of UL or CSA -certified cables (that have UL/CSA shown on the code) for any other electrical devices than products designated by Cloudbyte only.

Notes

Chapter 5

Advanced Serverboard Setup

This chapter provides detailed information on the serverboard. All serverboard jumpers and connections are described. A layout and quick reference chart are also included in this chapter for your reference. Remember to completely close the chassis when you have finished working with the serverboard to better cool and protect the system.

5-1 Handling the Serverboard

Electrostatic Discharge (ESD) can damage electronic components. To prevent damage to any printed circuit boards (PCBs), it is important to handle them very carefully (see previous chapter). To prevent the serverboard from bending, keep one hand under the center of the board to support it when handling. The following measures are generally sufficient to protect your equipment from electric static discharge.

Precautions

- Use a grounded wrist strap designed to prevent Electrostatic Discharge (ESD).
- Touch a grounded metal object before removing any board from its antistatic bag.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the serverboard, add-on cards and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

5-2 Cable and Device Connections

All data and power connections between the serverboard to the system (including the power supplies and the hard drives) are provided through the midplane. Most of these connections are made automatically when the system is assembled. "Right" and "left" refer to the side of the chassis as viewed from the front of the system. Also refer to Chapter 6 Section 5 for an image of the midplane with the connections listed below.

Power Connections

Power is routed from the power supplies to the power distribution board which in turn connects to the midplane. When the serverboards are seated in their bays they plug into the midplane to receive power.

Fan Cabling

All six cooling fans are connected to headers on the serverboard and may be monitored through IPMI. Fans can be accessed for replacement by removing the entire hot-swap server module.

Control Panels

A ribbon cable connects each control panel to the midplane. The right and left side control panels connect to JP1 and JP2 on the midplane, respectively.

5-3 Installing the Processor and Heatsink

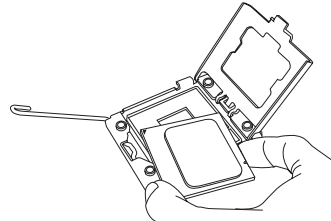
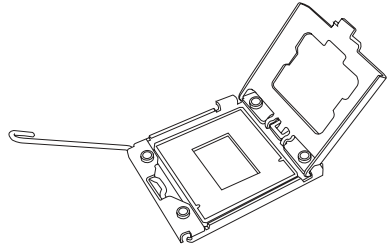
Caution: When handling the processor package, avoid placing direct pressure on the label area of the fan.

Notes:

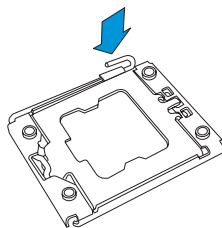
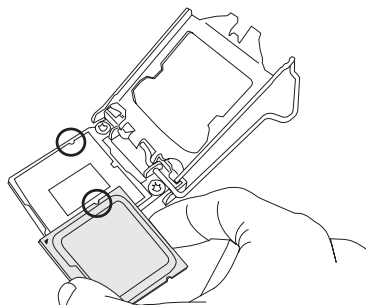
- Always connect the power cord last and always remove it before adding, removing or changing any hardware components. Make sure that you install the processor into the CPU socket before you install the CPU heatsink.
- If you buy a CPU separately, make sure that you use an Intel-certified multi-directional heatsink only.
- Make sure to install the serverboard into the chassis before you install the CPU heatsinks.
- When receiving a serverboard without a processor pre-installed, make sure that the plastic CPU socket cap is in place and none of the socket pins are bent; otherwise, contact your retailer immediately.
- Refer to the CloudByte web site for updates on CPU support.

Installing an LGA 1356 Processor

1. Press the socket clip to release the load plate covering the CPU socket from its locked position.
2. Gently lift the socket clip to open the load plate.
3. Hold the plastic cap at its north and south center edges to remove it from the CPU socket.
4. After removing the plastic cap, hold the CPU at the north and south center edges with your thumb and index finger.



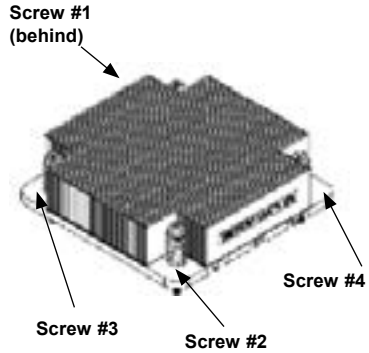
5. Align the CPU key, which is a semi-circle cutout, against the socket key, which is the notch below the gold color dot on the side of the socket.
6. Align pin 1 of the CPU against pin 1 of the CPU socket.
7. Once both CPU and the socket are aligned, carefully lower the CPU straight down into the socket. (To avoid damaging the CPU or the socket, do not rub the CPU against the surface of the socket or its pins.)
8. With the CPU inside the socket, inspect the four corners of the CPU to make sure that the CPU is properly installed.
9. Once the CPU is securely seated on the socket, lower the CPU load plate to the socket.
10. Use your thumb to gently push the socket clip down to the clip lock.



Warning: Please save the plastic cap. The serverboard must be shipped with the plastic cap properly installed to protect the CPU socket pins. Shipment without the plastic cap properly installed will cause damage to the socket pins.

Installing a CPU Heatsink

1. Remove power from the system and unplug the AC power cord from the power supply.
2. Do not apply any thermal grease to the heatsink or the CPU die; the required amount has already been applied.
3. Place the heatsink on top of the CPU so that the four mounting holes are aligned with those on the (preinstalled) heatsink retention mechanism.
4. Screw in two diagonal screws (i.e. the #1 and the #2 screws) until just snug. Do not fully tighten the screws or you may damage the CPU.)
5. Add the two remaining screws then finish the installation by fully tightening all four screws.



Removing the Heatsink

Warning: We do not recommend removing the CPU or the heatsink. If you need to remove the heatsink, please follow the instructions below to prevent damage to the CPU or other components.

1. Power down the node and unplug the AC power cord.
2. Unscrew and remove the heatsink screws in the sequence shown in the illustration above.
3. Hold the heatsink and gently wiggle it to loosen it from the CPU. (Do not use excessive force when doing this!)
4. Once the heatsink is loosened, remove it from the CPU.
5. Clean the surface of the CPU and the heatsink to get rid of the old thermal grease. Reapply the proper amount of thermal grease before you re-install the heatsink.

5-4 Installing Memory

Warning: Exercise extreme care when installing or removing DIMM modules to prevent any possible damage. Please refer to the CloudByte web site for possible updates to supported memory.

Memory Support

Each serverboard has six DIMM slots that can support up to 192 GB of Registered (RDIMM) ECC/Non-ECC DDR3-1866/1600/1333/1066/800 memory. Use memory modules of the same type and speed. See the following tables for memory installation.

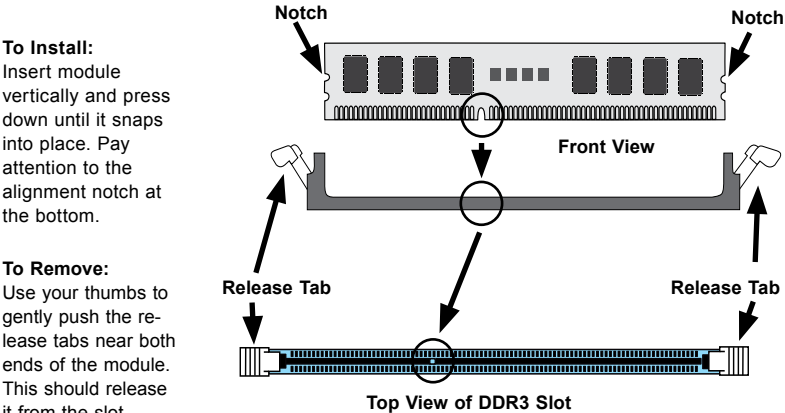
Note: For additional NVDIMM installation guidelines and developer kits, please contact your NVDIMM vendor.

DIMM Installation

Installing Memory Modules

1. Insert the desired number of DIMMs into the memory slots starting with DIMM #P1-DIMMA1. For optimal memory performance, please install a pair (or pairs) of memory modules of the same type and speed (see the Memory Installation Table below).
2. Insert each DIMM module vertically into its slot. Pay attention to the notch along the bottom of the module to avoid installing incorrectly (see Figure 5-3).
3. Gently press down on the DIMM module until it snaps into place in the slot. Repeat for all modules.

Figure 5-3. DIMM Installation



Note: Notch should align with the receptive key point on the slot.

DIMM Module Population Configuration

Refer to the tables below when installing memory.

Processors and their Corresponding Memory Modules			
CPU#	Corresponding DIMM Modules		
CPU 1	P1-DIMMA1	P1-DIMMB1	P1-DIMMC1
CPU2	P2-DIMMD1	P2-DIMME1	P2-DIMMF1

Processor and Memory Module Population for Optimal Performance	
Number of CPUs+DIMMs	CPU and Memory Population Configuration Table (For memory to work properly, please follow the instructions below.)
1 CPU & 2 DIMMs	CPU1 P1-DIMMA1/P1-DIMMB1
2 CPUs & 4 DIMMs	CPU1 + CPU2 P1-DIMMA1/P1-DIMMB1, P2-DIMMD1/P2-DIMME1
2 CPUs & 6 DIMMs	CPU1 + CPU2 P1-DIMMA1/P1-DIMMB1/P1-DIMMC1, P2-DIMMD1/P2-DIMME1/ P2-DIMMF1

Intel E5-2400 Series Processor RDIMM Memory Support					
Ranks Per DIMM & Data Width	Memory Capacity Per DIMM (See the Note Below)			Speed (MT/s) and Voltage Validated by Slot per Channel (SPC) and DIMM Per Channel (DPC)	
				1 Slot Per Channel	
				1DPC	
				1.35V	1.5V
SRx8	1GB	2GB	4GB	1066, 1333	1066, 1333, 1600
DRx8	2GB	4GB	8GB	1066, 1333	1066, 1333, 1600
SRx4	2GB	4GB	8GB	1066, 1333	1066, 1333, 1600
DRx4	4GB	8GB	16GB	1066, 1333	1066, 1333, 1600
QRx4	8GB	16GB	32GB	800	800
QRx8	4GB	8GB	16GB	800	800

Note: For the memory modules to work properly, please install DIMM modules of the same type, same speed and same operating frequency. Mixing of RDIMMs, UDIMMs or LRDIMMs is not allowed. Do not install both ECC and Non-ECC memory modules on the same serverboard.

Installing NVDIMMs

Please adhere to the following guidelines when installing NVDIMMs.

- If only one NVDIMM is used in the system, it can be installed into any DIMM slot on the board.
- If two or more NVDIMMs are used with regular DIMMs, the following limitations apply:
 - Three NVDIMMs or less: can only populate within one processor's DDR slots (all in the CPU1 or CPU2 slots but not spread between both).
 - More than three NVDIMMs: should populate all the CPU2 DIMM slot first, then any remaining into the CPU1 DIMM slots.

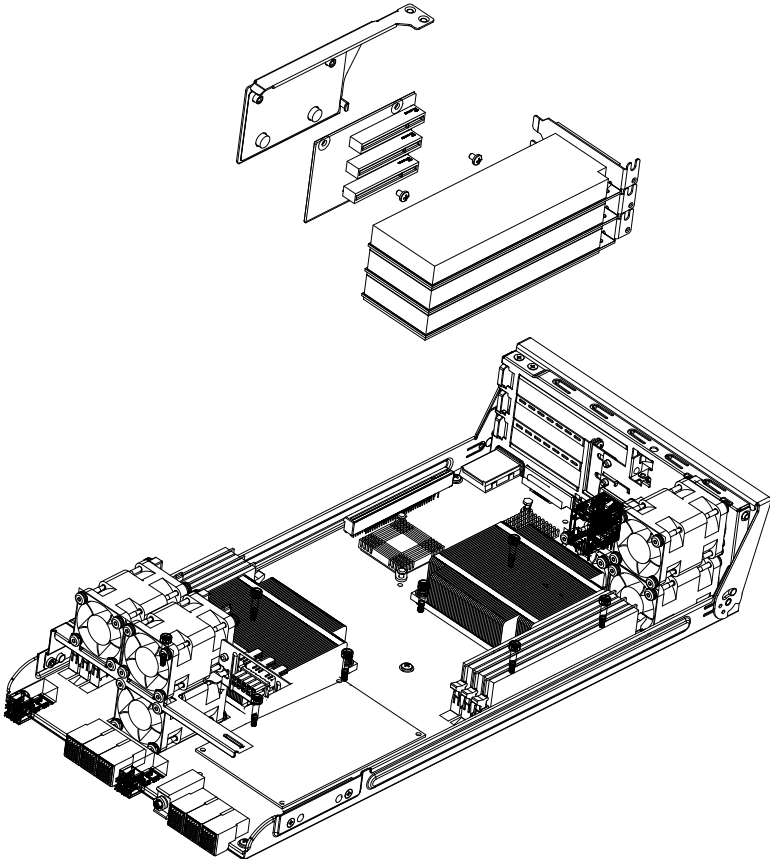
5-5 Installing PCI Add-On Cards

Each node in the ESA-50 can accommodate up to three PCI-E 3.0 x8 add-on cards.

Installing an Add-on Card (Figure 5-4)

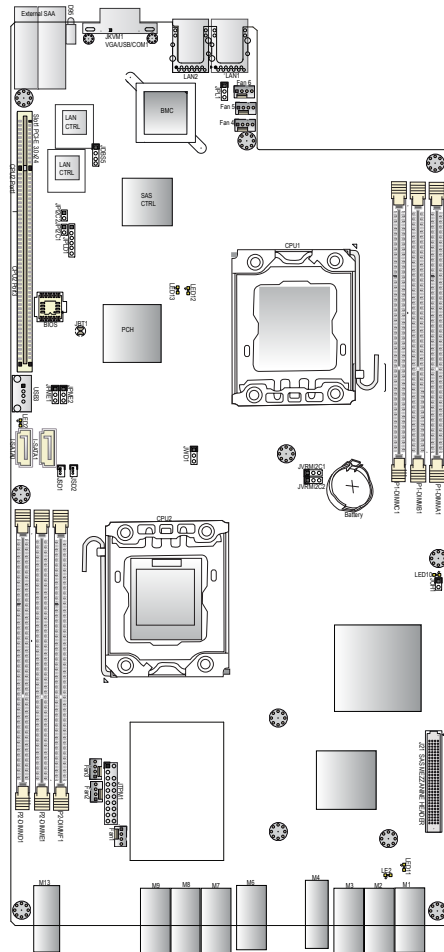
1. Begin by removing the node you wish to populate with add-on cards.
2. Locate the riser card and fully seat the cards into the slots in the riser, pushing down with your thumbs evenly on both sides of the card.
3. If standard size cards are used, only passive heatsinks may be used for the processors as the card size will interfere with active type heatsinks.

Figure 5-4. Installing Add-on Cards



5-6 Serverboard Details

**Figure 5-5. Serverboard Layout
(not drawn to scale)**



Notes

- "■" indicates the location of pin 1.
- Jumpers not indicated are for test purposes only and should not have their settings changed.

Serverboard Quick Reference

Jumper	Description	Default Setting
JBT1	Clear CMOS	See Section 5-8
JI ² C1/JI ² C2	SMB to PCI-E Slots	Open (Normal)
JPL1	GLAN 1/2 Enable/Disable	Pins 1-2 (Enabled)
JPME1	Manufacture Mode Select	Pins 1-2 (Normal)
JPME2	ME Recovery	Pins 1-2 (Normal)
JWD1	Watch Dog	Pins 1-2 (Reset)

Connector	Description
FAN1-6	CPU/System Fan Headers
J21	SAS Mezzanine Header
JKVM1	Keyboard/VGA/Mouse Connector
JOH1	Overheat/Fan Fail LED
JSD1/JSD2	SATA DOM (Device On Module) Power Connectors
JTPM1	TPM (Trusted Platform Module)/Port 80
LAN1/LAN2	Gigabit Ethernet LAN Ports 1/2 (LAN1/LAN2)
(External) SAS	External Serial-Link SAS Connector (with SAS mezzanine card)
(I-)SATA 0/1	Intel SATA Ports 0/1
Slot1	PCI-Exp. 3.0 x24 Slot (for riser card)
USB3	Type A USB Port

LED	Description	State/Status
D95	BMC Heartbeat	Up (BMC Heartbeat) Green: BMC Active
	System Heartbeat	Down (System Heartbeat) Green: Sys. Active
LE2	Onboard Power	Green: Onboard Power Connected
LED2	SATA Activity LED	Blinking Green: SATA Active
LED10/ LED11	SAS Activity LEDs	Blinking Green: SAS Active

5-7 Connector Definitions

KVM Port

The KVM port, located next to the LAN ports on the I/O backplane, provides keyboard/video/mouse connections. These connections can be used for remote console via BMC IPMI.

Fan Headers

The X9DBS-F has six fan headers (Fan1 - Fan6). These 4-pin fans headers are backward compatible with traditional 3-pin fans (which do not support fan speed control). Fan speed is controlled by IPMI. See the table on the right for pin definitions.

Fan Header Pin Definitions	
Pin#	Definition
1	Ground
2	+12V
3	Tachometer
4	PWR Modulation

External SAS Ports

Two External Mini-SAS HD ports are located on each server node to allow high bandwidth, 8-lane connectivity to the JBOD expansion units.

Ethernet Ports

Two Gigabit Ethernet ports (LAN1/ LAN2) are located on the I/O backplane to provide Ethernet connections. In addition, a Dedicated IPMI LAN also provides KVM support for IPMI 2.0.



Overheat/Fan Fail LED

The JOH1 header is used to connect an LED indicator to provide warnings of chassis overheating and fan failure. This LED will blink when a fan failure occurs. Refer to the table on right for pin definitions.

OH/Fan Fail LED Status	
State	Message
Solid	Overheat
Blinking	Fan Fail

TPM Header/Port 80

A Trusted Platform Module/Port 80 header is located at JTPM1 to provide TPM support and Port 80 connection. Use this header to enhance system performance and data security. See the table on the right for pin definitions.

TPM/Port 80 Header Pin Definitions			
Pin #	Definition	Pin #	Definition
1	LCLK	2	GND
3	LFRAME#	4	<(KEY)>
5	LRESET#	6	+5V (X)
7	LAD 3	8	LAD 2
9	+3.3V	10	LAD1
11	LAD0	12	GND
13	SMB_CLK4	14	SMB_DAT4
15	+3V_DUAL	16	SERIRQ
17	GND	18	CLKRUN# (X)
19	LPCPD#	20	LDRQ# (X)

SATA DOM Power Connectors

Two power connectors for SATA DOM (Disk On Module) devices are located at JSD1/JSD2. Connect appropriate cables here to provide power support for your DOM devices.

DOM PWR Pin Definitions	
Pin#	Definition
1	+5V
2	Ground
3	Ground

Universal Serial Bus (USB)

A Type A connector (USB 3) is located on the serverboard to provide front USB support. (Cable is not included). See the table on the right for pin definitions.

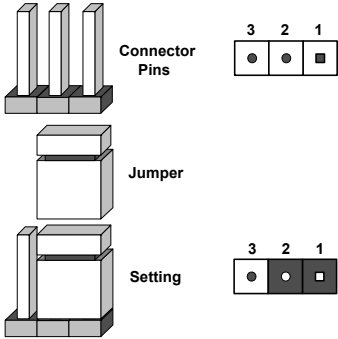
Type A USB Pin Definitions	
Pin#	Definition
1	+5V
2	PO-
3	PO+
4	Ground
5	NA

5-8 Jumper Settings

Explanation of Jumpers

To modify the operation of the serverboard, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. See the serverboard layout pages for jumper locations.

Note: On a two-pin jumper, "Closed" means the jumper is on both pins and "Open" means the jumper is either on only one pin or completely removed.



CMOS Clear

JBT1 is used to clear CMOS (which will also clear any passwords). Instead of pins, this jumper consists of contact pads to prevent accidentally clearing the contents of CMOS.

To clear CMOS,

1. First power down the system and unplug the power cord(s).
2. With the power disconnected, short the CMOS pads with a metal object such as a small screwdriver.
3. Remove the screwdriver (or shorting device).
4. Reconnect the power cord(s) and power on the system.

Note: Do not use the PW_ON connector to clear CMOS.

LAN1/2 Enable/Disable

Change the setting of jumper JPL1 to enable or disable the LAN1 and LAN2 Ethernet ports. See the table on the right for jumper settings. The default setting is enabled.

LAN1/2 Enable/Disable Jumper Settings (JPL1)	
Jumper Setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled

Watch Dog Enable/Disable

Jumper JWD controls the Watch Dog function. Watch Dog is a system monitor that can reboot the system when a software application hangs. Jumping pins 1-2 will cause WD to reset the system if an application hangs. Jumping pins 2-3 will generate a non-maskable interrupt signal for the application that hangs. See the table on the right for jumper settings. Watch Dog must also be enabled in BIOS.

Note: When enabled, the user needs to write their own application software in order to disable the Watch Dog Timer.

Watch Dog Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Reset
Pins 2-3	NMI
Open	Disabled

Manufacture Mode

JPME1 allows the user to flash the system firmware from a host server. Jump pins 2-3 to bypass SPI flash security, and force ME into Recovery mode in order to use recovery jumpers. See the table on the right for jumper settings.

ME Mode Select Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Normal (Default)
Pins 2-3	Manufacture Mode

ME Recovery

JPME2 is used for ME Firmware Recovery mode, which will limit system resources for essential functions only without putting restrictions on power use. In single operation mode, online upgrade will be available via recovery mode. See the table on the right for jumper settings.

ME Recovery Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Normal (Default)
Pins 2-3	ME Recovery

I2C Bus to PCI-Exp. Slots

Jumpers JI²C1 and JI²C2 allow you to connect the System Management Bus (I²C) to the PCI-Express slot (Slot1) on the serverboard. The default setting is Open to disable the connection. See the table on the right for jumper settings.

I ² C to PCI-Exp Jumper Settings	
Jumper Setting	Definition
Closed	Enabled
Open	Disabled (Default)

5-9 Onboard Indicators

LAN LEDs

The Ethernet ports (located on the I/O backplane) have two LEDs. On each port: the green LED flashes to indicate activity while the other LED may be green, amber or off to indicate the speed of the connection. See the table on the right for the functions associated with the connection speed LED.



LAN1/2 LED (Connection Speed Indicator)	
LED Color	Definition
Off	No Connection or 10 Mb/s
Amber	100 Mb/s
Green	1 Gb/s

BMC Heartbeat/System Heartbeat LED

A BMC/System Heartbeat LED is located at D95 on the serverboard. When D95 is up, it functions as a BMC Heartbeat LED. When D95 is down, it is used as a System Heartbeat LED. When D95 is blinking, BMC and the system function normally. See the table at right for more information.

BMC Heartbeat/System Heartbeat LED Status	
Color/State	Definition
Up	BMC Heartbeat LED
Down	System Heartbeat LED
Green: Blinking	BMC/System: Normal

Onboard Power LED

An Onboard Power LED is located at LE2 on the serverboard. When this LED is on, the system is on. Be sure to turn off the system and unplug the power cord before removing or installing components. See the table at right for more information.

Onboard PWR LED Indicator LED States	
LED Color	Definition
Off	System Off (PWR cable not connected)
Green	System On
Green: Flashing Quickly	ACPI S1 State

SATA Heartbeat LED

A SATA Heartbeat LED is located at LED2 on the serverboard. When LED2 is blinking, SATA is functioning normally. See the table at right for more information.

SATA Heartbeat LED Status	
Color/State	Definition
Green: Blinking	SATA: Normal

SAS Activity LED

SAS Activity LEDs are located at LED10/LED11 on the serverboard. When LED10/LED11 are blinking, SAS is active. See the table at right for more information.

SAS Activity LED Status	
Color/State	Definition
Green: Blinking	SAS: Active

5-10 Serial ATA Ports

Serial ATA Ports

There are two Serial ATA Ports (I-SATA0/I) located on the serverboard. See the table on the right for pin definitions.

Serial ATA Pin Definitions	
Pin#	Definition
1	Ground
2	TX_P
3	TX_N
4	Ground
5	RX_N
6	RX_P
7	Ground

Chapter 6

BIOS

6-1 Introduction

This chapter describes the AMI BIOS Setup utility for the serverboard. It also provides the instructions on how to navigate the AMI BIOS Setup utility screens. The AMI ROM BIOS is stored in a Flash EEPROM and can be easily updated.

Starting BIOS Setup Utility

To enter the AMI BIOS Setup utility screens, press the <Del> key while the system is booting up.

Note: In most cases, the <Del> key is used to invoke the AMI BIOS setup screen. There are a few cases when other keys are used, such as <F3>, <F4>, etc.

Each main BIOS menu option is described in this manual. The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured. Options in blue can be configured by the user. The right frame displays the key legend. Above the key legend is an area reserved for informational text. When an option is selected in the left frame, it is highlighted in white. Often, informational text about the option will display on the right.

Note: The AMI BIOS has default informational messages built in. The manufacturer retains the option to include, omit, or change any of these informational messages.

The AMI BIOS Setup utility uses a key-based navigation system called "hot keys." Most of the AMI BIOS setup utility "hot keys" can be used at any time during setup navigation. These keys include <F3>, <F4>, <Enter>, <ESC>, arrow keys, etc.

Note 1: In this section, options printed in **Bold** are default settings.

Note 2: <F3> is used to load optimal default settings. <F4> is used to save the settings and exit the setup utility.

6-2 Boot

This submenu allows the user to configure the following boot settings for the system.

Set Boot Priorities

1st Boot Device/2nd Boot Device/3rd Boot Device/4th Boot Device/5th Boot Device/6th Boot Device

Use this feature to specify the sequence of boot priority for a device specified by the user.

►Delete Boot Option

This feature allows the user to select a boot device to delete from the boot priority list.

►Network Device BBS Priorities

This submenu allows the user to specify the boot priority sequence of a network device.

1st Device

►UEFI Boot Device BBS Priorities

This submenu allows the user to specify the boot priority sequence of a UEFI bootable device.

1st Device

6-3 Security

This menu allows the user to configure the security settings for the system.

Administrator Password



Use this feature to set the Administrator Password which is required to enter the BIOS setup utility. The length of the password should be from 3 characters to 20 characters long.

User Password

Use this feature to set a User Password which is required to log into the system and to enter the BIOS setup utility. The length of the password should be from 3 characters to 20 characters long.

Password Check

This feature allows the user to decide if a password is required to enter the BIOS Setup utility or upon system boot. The options are **Setup** and **Always**.

6-4 Save & Exit

This submenu allows the user to configure the Save and Exit settings for the system.

Discard Changes and Exit

Select this option to quit the BIOS Setup without making any permanent changes to the system configuration, and reboot the computer. Select Discard Changes and Exit, and press <Enter>. When the dialog box appears, asking you if you want to exit the BIOS setup without saving, select **Yes** to quit BIOS without saving the changes, or select **No** to quit the BIOS and save changes.

Save Changes and Reset

When you have completed the system configuration changes, select this option to save the changes and reboot the computer so that the new system configuration settings can take effect. Select Save Changes and Exit, and press <Enter>. When the dialog box appears, asking you if you want to exit the BIOS setup without saving, select **Yes** to quit BIOS without saving the changes, or select **No** to quit the BIOS and save changes.

Save Options

Save Changes

Select this option and press <Enter> to save all changes you've done so far and return to the AMI BIOS utility Program. When the dialog box appears, asking you if you want to save configuration, select **Yes** to save the changes, or select **No** to return to the BIOS without making changes.

Discard Changes

Select this feature and press <Enter> to discard all the changes and return to the BIOS setup. When the dialog box appears, asking you if you want to load previous values, select **Yes** to load the values previous saved, or select **No** to keep the changes you've made so far.

Restore Optimized Defaults

Select this feature and press <Enter> to load the optimized default settings that help optimize system performance. When the dialog box appears, asking you if you want to load optimized defaults, select **Yes** to load the optimized default settings, or select No to abandon optimized defaults.

Save as User Defaults

Select this feature and press <Enter> to save the current settings as the user's defaults. When the dialog box appears, asking you if you want to save values as user's defaults, select **Yes** to save the current values as user's default settings, or select No to keep the defaults previously saved as the user's defaults.

Restore User Defaults

Select this feature and press <Enter> to load the user's defaults previously saved in the system. When the dialog box appears, asking you if you want to restore user's defaults, select **Yes** to restore the user's defaults previously saved in the system, or select No to abandon the user's defaults that were previously saved.

Boot Override

This feature allows the user to override the Boot Option Priorities setting in the Boot menu, and instead immediately boot the system with one of the listed devices. This is a one-time override.